



# STGD7NB120S-1

N-CHANNEL 7A - 1200V - IPAK

PowerMESH™ IGBT

PRELIMINARY DATA

TYPE	V <sub>CES</sub>	V <sub>CE(sat)</sub>	I <sub>C</sub>
STGD7NB120S-1	1200 V	< 2.1 V	7 A

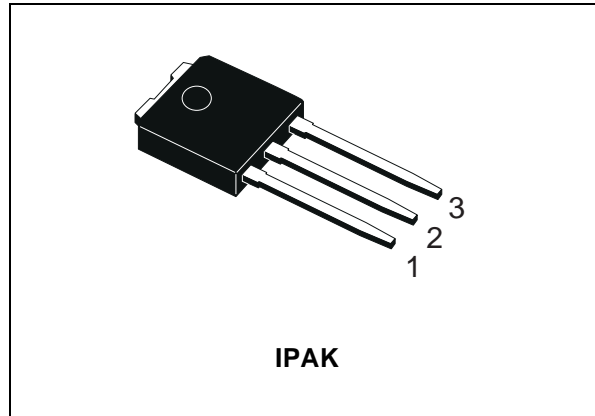
- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- VERY LOW ON-VOLTAGE DROP (V<sub>cesat</sub>)
- OFF LOSSES INCLUDE TAIL CURRENT
- HIGH CURRENT CAPABILITY

## DESCRIPTION

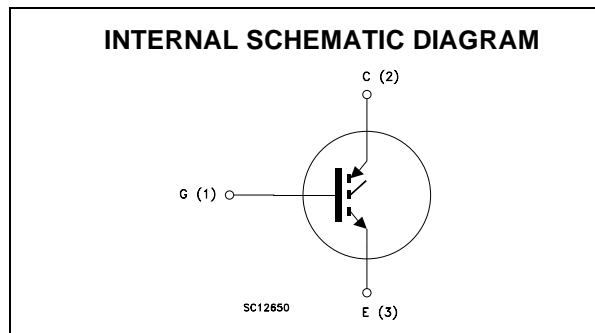
Using the latest high voltage technology based on a patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, the PowerMESH™ IGBTs, with outstanding performances. The suffix "S" identifies a family optimized achieve minimum on-voltage drop for low frequency applications (<1kHz).

## APPLICATIONS

- MOTOR CONTROL
- LIGHT DIMMER
- INTRUSH CURRENT LIMITATION



IPAK



INTERNAL SCHEMATIC DIAGRAM

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CES</sub>	Collector-Emitter Voltage (V <sub>GS</sub> = 0)	1200	V
V <sub>ECR</sub>	Reverse Battery Protection	20	V
V <sub>GE</sub>	Gate-Emitter Voltage	±20	V
I <sub>C</sub>	Collector Current (continuous) at T <sub>C</sub> = 25°C	10	A
I <sub>C</sub>	Collector Current (continuous) at T <sub>C</sub> = 100°C	7	A
I <sub>CM</sub> (■)	Collector Current (pulsed)	20	A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 25°C	55	W
	Derating Factor	0.4	W/°C
T <sub>stg</sub>	Storage Temperature	-65 to 150	°C
T <sub>j</sub>	Max. Operating Junction Temperature	150	°C

(■) Pulse width limited by safe operating area

## STGD7NB120S-1

### THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	2.27	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	100	°C/W
Rthc-h	Thermal Resistance Case-heatsink Typ	0.5	°C/W

### ELECTRICAL CHARACTERISTICS (TCASE = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{BR(CES)}$	Collectro-Emitter Breakdown Voltage	$I_C = 250 \mu A, V_{GE} = 0$	1200			V
$V_{BR(ECR)}$	Emitter-Collectro Breakdown Voltage	$I_C = 10 mA, V_{GE} = 0$	20			V
$I_{CES}$	Collector cut-off ( $V_{GE} = 0$ )	$V_{CE} = \text{Max Rating}, T_C = 25 \text{ }^\circ\text{C}$ $V_{CE} = \text{Max Rating}, T_C = 125 \text{ }^\circ\text{C}$			50 250	$\mu A$ $\mu A$
$I_{GES}$	Gate-Emitter Leakage Current ( $V_{CE} = 0$ )	$V_{GE} = \pm 20V, V_{CE} = 0$			$\pm 100$	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Threshold Voltage	$V_{CE} = V_{GE}, I_C = 250 \mu A$	3		5	V
$V_{GE}$	Gate Emitter Voltage	$V_{CE} = 2.5V, I_C = 2A,$ $T_J = 25 \div 125 \text{ }^\circ\text{C}$			6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE} = 15V, I_C = 3.5 A$ $V_{GE} = 15V, I_C = 7 A$ $V_{GE} = 15V, I_C = 10 A$		1.7	1.6 2.1	V V

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs}$	Forward Transconductance	$V_{CE} = 25 V, I_C = 7 A$	2.5	4.5		S
$C_{ies}$	Input Capacitance	$V_{CE} = 25V, f = 1 \text{ MHz}, V_{GE} = 0$		430		pF
$C_{oes}$	Output Capacitance			40		pF
$C_{res}$	Reverse Transfer Capacitance			7		pF
$Q_g$	Gate Charge	$V_{CE} = 960V, I_C = 7 A,$ $V_{GE} = 15V$		29		nC
$I_{CL}$	Latching Current	$V_{clamp} = 960V, T_J = 150 \text{ }^\circ\text{C}$ $R_G = 1K\Omega$	10			A

### SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 960 V, I_C = 7 A$ $R_G = 1K\Omega, V_{GE} = 15 V$		570		ns
$t_r$	Rise Time			270		ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{CC} = 960 V, I_C = 7 A, R_G = 1K\Omega$ $V_{GE} = 15 V, T_J = 125 \text{ }^\circ\text{C}$		800		A/ $\mu s$
$E_{on}$	Turn-on Switching Losses			3.2		$\mu J$

**ELECTRICAL CHARACTERISTICS (CONTINUED)****SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_c$	Cross-over Time	$V_{CC} = 960 \text{ V}$ , $I_C = 7 \text{ A}$ , $R_{GE} = 1 \text{ K}\Omega$ , $V_{GE} = 15 \text{ V}$		4.9		$\mu\text{s}$
$t_r(V_{off})$	Off Voltage Rise Time			2.9		$\mu\text{s}$
$t_f$	Fall Time			3.3		$\mu\text{s}$
$E_{off(**)}$	Turn-off Switching Loss			15		mJ
$t_c$	Cross-over Time	$V_{CC} = 960 \text{ V}$ , $I_C = 7 \text{ A}$ , $R_{GE} = 1 \text{ K}\Omega$ , $V_{GE} = 15 \text{ V}$ $T_j = 125 \text{ }^\circ\text{C}$		7.5		$\mu\text{s}$
$t_r(V_{off})$	Off Voltage Rise Time			5.5		$\mu\text{s}$
$t_f$	Fall Time			6.2		$\mu\text{s}$
$E_{off(**)}$	Turn-off Switching Loss			22		mJ

Note: 1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.  
 2. Pulse width limited by max. junction temperature.  
 (\*\*) Losses include Also the Tail (Jedec Standardization)

Fig. 1: Gate Charge test Circuit

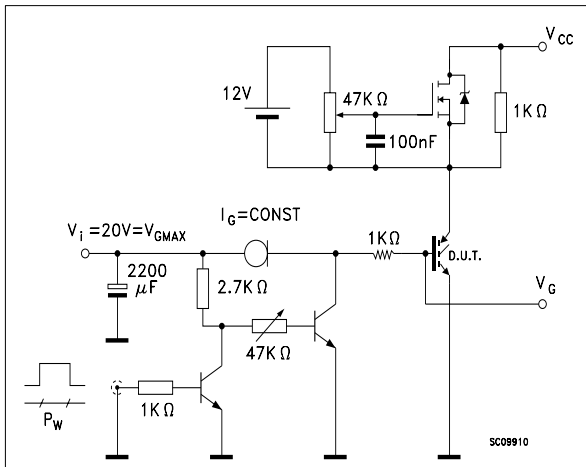
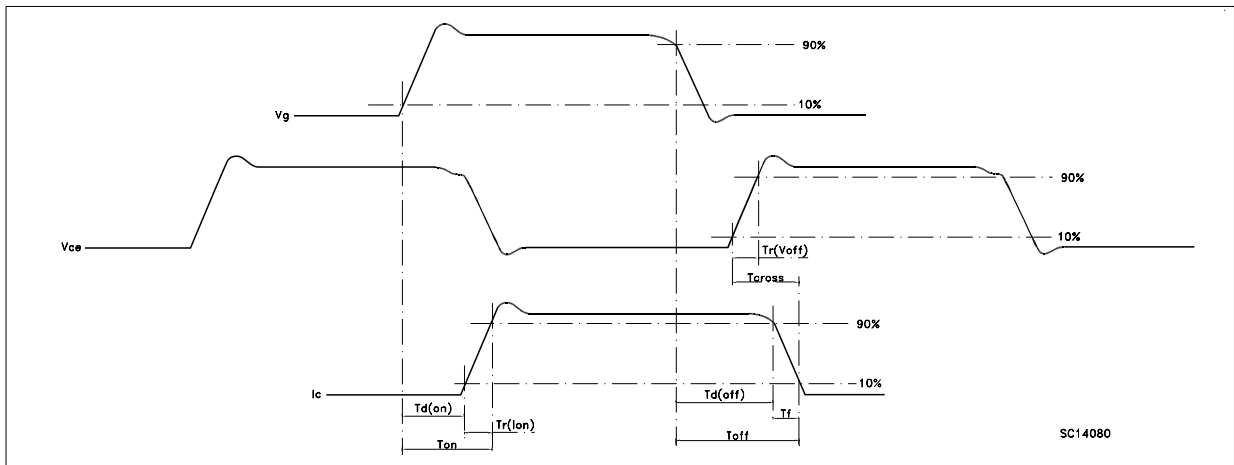
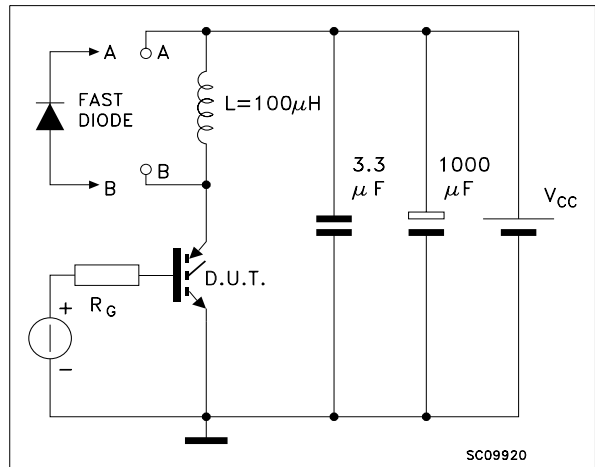
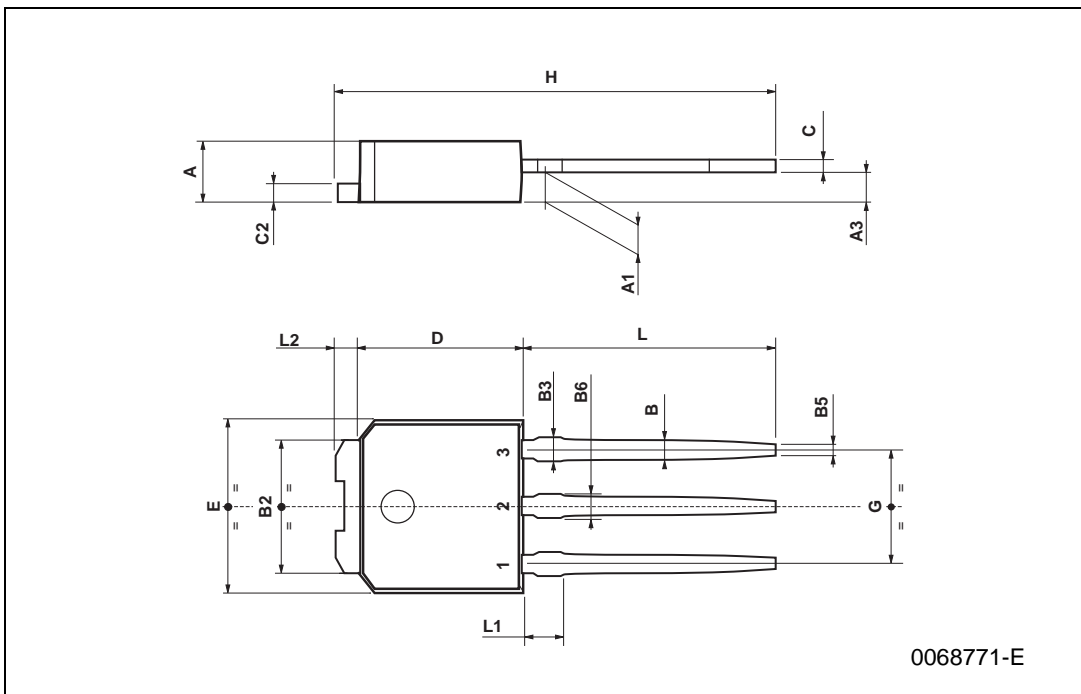


Fig. 2: Test Circuit For Inductive Load Switching



**TO-251 (IPAK) MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A3	0.7		1.3	0.027		0.051
B	0.64		0.9	0.025		0.031
B2	5.2		5.4	0.204		0.212
B3			0.85			0.033
B5		0.3			0.012	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	15.9		16.3	0.626		0.641
L	9		9.4	0.354		0.370
L1	0.8		1.2	0.031		0.047
L2		0.8	1		0.031	0.039



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